Geologist Interviews

Michelle Marin and Jeremy Musson are professional geologists in Colorado who share a lifelong passion for geology and visiting rock formations. Their work in environmental compliance made them ideal conversation partners for deepening my understanding of geological processes and the inherent wonder of rocks. Our discussion sparked many creative ideas about geology, pressure, and time. They described rocks acting like tricksters and offered vivid examples of the drama of strata formation. Musson reflected on Pangea and the continents' slow drift back together as a hopeful metaphor in a politically and socially fractured moment—an eventual, literal coming together. Marin spoke about deep time inspiring imaginings of distant pasts and futures, and found comfort in a planet and universe that will far outlast human crises. Both resonated with my own existential grief. Musson even shared that he has recently suffered severe depression in response to societal pressures. Both emphasized the healing role of humor, aligning with other interviewees. They also revealed troubling examples of anthropocentrism and capitalism in practice. The for-profit structure of environmental cleanup and compliance, shaped by stakeholder demands, the lure of high salaries, and the challenges of sensitive toxin-assessing technology, imposes significant limits. They further noted the pervasive presence of environmental toxins, everywhere and in everything.

Julie Jablonski: To start us off, imagine you're eighteen years old and you're picking your major. Jeremy, you landed on marine geology, Michelle, on geology slash environmental science. What was it that excited you about geology? What was the thing?

Jeremy Musson: Hard rock geology is about pressure and time and heat. At one point in time, everything was covered with water, so that's where you get the fossil beds around here [Colorado], it's all sedimentary hard rock geology. And I love that. It’s all solidified and layered.

Michelle Marin: So, I went in as a bio major because I was going to be a doctor. My first semester I set myself up with calculus, biology, chemistry and some other science class and about had a heart attack and realized I didn’t want to be a doctor. As soon as I took my first geology class, that was it. We would all pile in a van and go look at rocks. It was so much fun. I just fell in love with it and it got me on the path of doing environmental cleanups.

JJ: Speaking to the environmental side of things, how is that for you guys? I would imagine your work is meaningful and mission-driven with an important purpose. And also, you're kind of on the front lines of our environmental crisis. You're doing something good while intimately privy to painful truths. How do those experiences reconcile and function for you?

MM: It's actually good you said that because I think sometimes, we forget the mission that you just said. At this point we're trying to run a business, which is a very different priority. The fundamental part of it can get lost sometimes. It is still generally in the forefront that we try to balance doing the right thing and making the client happy.

JM: I would not say reconciled, but over time…when you're rolling out of college, you come out with a set of ideals. My kids are going through this now. My youngest is in his Marxist phase of life. My oldest is in this idealistic phase of the way things should be without compromise. That's how we roll out of college: “things need to be cleaned up. And there's just no excuse for a lot of what we do.” My planned path

was different than what it is now. I was gonna get a PhD and be a wicked smart geologist. I had the school picked out. Then my dad told me the consultant he worked with had an opening for a geologist and told me to send him my resume. I said, okay. And I did, and I got a job that at the time was stupid money. There's no excuse for turning that down, regardless of what my future plans might be. And I did it. And so going for a doctorate would be stupid for me. Just a total waste of energy.

So that's how I got into consulting. And my approach has evolved into being pragmatic. My passion is more in helping people understand that zero is not the answer. Pristine and fully clean without any kind of potential impact is not the answer because it [environmental toxin] is everywhere and if that is your standard for success then, one, you're never going to be happy with what you're doing, and two, there's never any money to get there. You're just going to face a fight the whole way there from everybody that you have to deal with. You need to take a step back and look at the “do no harm” component of things. You need to look at not doing science by fear, which is what we've gotten into. Because the information on environmental hazards is so fast to get out to the public, everybody knows something could be bad for you and they consider the only right answer to be zero. Emerging contaminants (that is, things we don't really know about yet), used to sit in this underworld of science. We would work on figuring out their toxicology and everything about them until we understood the science. Only then did we start publishing things and making regulations to do good. But now, as soon as the media gets a hold of something that might be bad for you, everybody immediately thinks that there's no excuse for anything being in anything that you drink or do.

Previously, in the beginning of our careers, there were certain concentration levels of things you just couldn't see below. Because methods didn't allow it. But that technology, as with all technology, has gotten more nanoscale. So now the concentrations that we can detect mean there is never a zero, you always see something. And as soon as you have a confirmation of the presence of something, somebody's upset about it. It is inevitable. There are those who don't understand this has been part of our lives for a hundred years and there have been benefits to this. PFAS is what is in Teflon and while it is a problem, Teflon has done some amazingly great things.

MM: Oh, and waterproofing, and firefighting foam, and food and medical.

JM: All of the medical things.

MM: That's why it's everywhere, because it was in everything. And when did they start using PFAS, in like the 70s?

JM: I don't even know, but it's in Gore-Tex, it's in so many things. And so these things that we use that have saved millions of lives have a problem and we need to figure out what that problem is, but we also, I think need to reflect on the fact it did good. It was not a purely evil thing. Maybe how the companies who invented it operated, there could have been some evil stuff going on with them. Dow Chemical, 3M. They're straight profit-driven, but that's a whole other conversation about profit-driven everything, and it's all about the bottom line. And shareholders maybe aren't the best way to decide what we do. But we still need to look at the bigger picture. The alternative was cotton and people were dying because they froze. Or the alternative was water and people were dying because we couldn't put out the fires. So, let's back up a minute and reflect on the good side of it and the bad side and maybe not be punitive and see how we can do better in the future.

JJ: You know enough to see the nuance. You don't have the, maybe the word is luxury, of being an absolutist, you see that it's complicated.

MM: Everything's complicated. The labs are analyzing this stuff to parts per trillion, which is insane. Not that there's anything we can do about treating it. You know, it's there. It's everywhere now. What did they just say? It's in, maybe it was 80% of the drinking water systems. When you're analyzing through parts per trillion, that's just where the numbers are. It's just everywhere.

JJ: How does what you studied or your work, affect the way you look at land and time?

JM: Backing up to principles of geology and your project, there could be something in the principles of geology and art and how that could be morphed into our humanity situation. Pressure turns things into diamonds. So how could you portray this pressure that we're all under and feeling, that ultimately could result in something that is extremely rare and valuable? A brain turning into a diamond. Utah Phillips, the poet, a musician. He talks about following the path of least resistance. Which is what makes a river crooked. This is a hard path we're on, but the hard path is really what's going to be rewarding and get us to the end of a good thing. That's just kind of a geology-based theory. You're going to erode the soft stuff, and you're going to be able to get through that, but if we really forge forward through the hard trail, the end is probably a better place to get to. And there's five or seven, I don't even remember them all, basic geologic principles, like the principle of original horizontality.

JJ: Steno's laws, four of them. They’re a key component of my thesis.

JM: He's a big geologist.

JJ: I hear what you're saying Jeremy. The pressure. I'm trying to look at these moments of differential or shifts, these changes that occur, the river decides to go this way. Given enough time and pressure, coal becomes a diamond. What opportunities exist in acknowledging that these alterations occur, because they do occur. What are opportunities with these pressure or pain points, these moments of shift? These philosophical or existential or internally emotional tectonic shifts. Where is there opportunity in that, if we let there be?

MM: You have to be able to see the opportunity. I was always interested in the global aspect of geological epochs and Pangea and the supercontinent breaking up, and the different geological ages and the Cretaceous and Jurassic. I looked at paleontology for a while, when picking a major.

JJ: What was the magic or what sparked your imagination with those things?

MM: Dinosaurs. Space exploration. Time travel. I was always a huge science fiction geek. Getting to see what the planet was like, however many million years ago, that's what always got me really interested in this.

JM: So the concept of Pangea is an interesting one because the continents, we're all moving apart, but we're also moving together.

MM: Um hmm!

JM: So at some point in time, in a billion years or whatever, we're going to crash together. We're just on the other side.

MM: Yes!

JM: So if we think about this in terms of today's political and social reality, many of us feel like we need to be stabilized. And we have this fear of where we're going because it is so violent that there's no way where we're going has the ability to be positive, so there's this push-pull to that. Maybe if our perspective shifts and we

accept that we're not going to change. But we need to move forward. Can we change or embrace what that forward looks like and sort of shape it into whatever is the outcome that is positive? And we are eventually going to all come back together.

MM: I like that a lot. Yeah, we can't stop it. It's happening. It is what it is.

JM: And if we embrace that, then that resistance component goes away and we start actually helping to bring stuff together.

MM: Because you spend a lot of energy resisting it. You can see an anxiety and just freaking out about what's going on and I think to a certain point you just have to say this is what's going on, it just is.

JJ: Does deep time give you any type of hope or other feeling? Is it comforting for you, is it terrifying, is it difficult, what does it do for you?

MM: I think it's comforting in a way knowing that even if we fuck everything up including the planet and the environment and eventually, if we can't breathe which I'm fairly sure is gonna happen in a few hundred years, that the universe will still go on. I still firmly believe that there's life on other planets, with how many planets there are how can there not be? Also, it is comforting in a way, to know that life on Earth has been evolving for millions of years, and we're just a point in time. So what's next? I don't know. It could be Planet of the Apes. It could be intelligent cockroaches. So it is comforting in a way, but it doesn't bother me. I think it might bother a lot of people. It doesn't bother me to think that eventually the planet could move on to something else or, the universe could move on to something else. I kind of like it.

JJ: I've lived in Venezuela. Cockroaches *are* intelligent. I have a weird question: are there any geological phenomena that you can think of that kind of behave like

tricksters; misleading, shapeshifting, defying categorization? Anything where rock or principles of geography are not following rules or are behaving in a surprising way? I know this is an abstract question.

MM: Groundwater, maybe?

JM: Groundwater can.

MM: We still get surprises. A lot of what we do is drilling wells and taking groundwater samples to see if groundwater's been impacted by contaminants, right? So we have to understand the geology. Say this is the ground and there's a factory that's polluting and the pollutants are going into the soil and flowing down. If you have a big clay layer right here, you would kind of expect the little perched aquifer to get impacted. So nobody drinks from that. It’s the deeper aquifers that people use for drinking. But this can all get really quirky. Like remember those coal seams in Wamsutter? We were drilling wells and it just wasn't making sense. As it turns out, there was a random coal seam or two or three cutting across the site that just kind of fucked everything up. Usually, I feel like geology is simpler to understand, but the groundwater kind of forms around the geology, so maybe it doesn't.

JM: The issue with geology is that you can dig into the topsoil, the sand, the alluvial rocks and river. It's pretty predictable how groundwater is going to flow through them. It usually flows downhill in a straight line. So if you get a weird kind of curve in it, generally something's wrong with your data. We used to always talk about how groundwater doesn't take a right angle. It doesn't turn 90 degrees. But there are places in Arizona, where it in fact does turn 90 degrees. Because the groundwater is following a buried alluvial channel from a prehistoric, buried riverbed. It's because of what's happening in geology. You're looking across the landscape and you're

thinking you know what's going on because you can see everything that there is, but what's going on underground you have no idea. It’s a mystery.

Here’s another trickster example. Last weekend, on I-70 around Idaho Springs, I saw these folds in the geology. There's the principle of original horizontality, right? And the only way it didn't follow horizontality is if some other force acted on it, which folded it. The fact that geology can fold, turn and give the rock S curves-I just looked at it and I was like, that's freaking bananas up there. Because it has totally folded on itself in an S curve. And so you've got the original layer that then got folded over. Your geology would say that you were drilling through multiple layers of depositional environments. And it's fully logical because you can get these repeat layers and unless you date it, you wouldn't know that this top layer was actually the same as the bottom layer. Freaking bananas.

(photo of road on side of I-70)

JJ: Does all this shape how you look at the land?

MM: A hundred percent. Because of what I do, I've gotten away from the geology a little bit and I'm doing more general environmental compliance. So I'm more in a situation where I'll walk into a place and I'll be like, “oh my God, that storage tank is about to explode!” But I still really enjoy driving around and seeing the geology and just having that understanding of it. And thinking about what's maybe below *that*

over there. It makes me think about it more. And I still like going into those stupid rock shops in Arizona and looking at the rocks and the fossils.

JM: Have you been to Kauai? The Nepali coast of Kauai; the scale of things is freaking bonkers. Like, stuff's big here, but we start a mile above sea level, so we really only go up 10,000 feet. They start at the ocean and go up 10,000 feet. It's a totally different scale.

JJ: Like Denali is actually the tallest mountain in the world from base to tip. Everest reaches the highest elevation, but it starts much higher up. Side by side, Denali is taller; it has the greater vertical rise.

JM: Exactly. And there's an extinct volcano lava tube on Kauai. It's this big round basalt eye on the sheer cliff of the Nepali coast. And it's like 1,000 feet in diameter. And when you're on the ocean, it looks small. But it was a tube that lava would have just been exploding from, full to the top, a thousand feet of lava. I don't care as much about the trees and all the stuff. It's pretty, but I tend to spend more time looking at the rocks and the formations.

MM: Yeah, we have a biology group that does trees and stuff. I don't really care about that.

JM: I'm from coastal Maine and Acadia National Park and the glacial geology there is really cool. How stuff formed on the Schoodic Peninsula. It was bananas, so cool! Basalt is the black rock that is generally from volcanic intrusions. Basaltic dikes cut across the granite and it's bonkers. There's one huge cut across the whole peninsula.

MM: It really helps you understand the power behind it, right? Yeah, it makes you think.

JJ: I like hearing you talk shop and be excited about this world that I don't know anything about.

JM: That's why when people ask me what I do, I still say “geology, I'm a geologist.” Which we still do.

MM: We still do geology. Not as much as we'd like, probably. But we still do it.

JJ: Is there anything that you wish or would want people to know about geology or rocks?

MM: No, I feel like a lot of the stuff I know is scary. And it's probably better that most people don't know it. Like learning about the fact that they've been putting sewage sludge full of PFAS on the ground that they're growing the crops on for like 20 years, and things like that. I would not buy a house within a couple houses of a highway or Rocky Flats. But no, I feel like a lot of the stuff I would tell people would just scare them.

JJ: Off topic, how do you guys cope with existential terror and the things in the news and what's going on? Do you use humor? What do you do?

JM: I would say yes. I am struggling. Two weeks ago, I had a really bad week. It was bad. I wear my emotions on my sleeve, except for when it's real, at which point I just kind of get quiet because it's too big, it's too scary. It’s too much. And I don't need to drag people down because everybody's kind of going through a similar thing. Seeing the same things, worried about the same things, not sure how we're going to make it through the same things. Trying to figure out how to have a conversation with people who just don't seem to get it. Anyway, I had a really bad week.

JJ: Was it the Charlie Kirk?

JM: No it wasn't. I feel like the motive behind Charlie Kirk was pretty clear. When the Evergreen school shooting happened, that put Brian into a very bad place.

JJ: Is that your son?

JM: No it's another one of our co-workers. He lives up there. Yeah. And his daughter goes to Conifer High School. But it's his community.

JJ: Yeah, same neighborhood.

JM: Those two schools ended up dealing with this thing together. I don't spiral into... I read... a lot of satire, because that's how I can absorb difficult things. But anyway, I think it was one of the first times ever, that I told Margs that I was struggling. I didn't know the exit point. It was very, very bad. And then I'm pretty sure something happened the next day and I was OK. It was something funny that Brian did, which made me laugh.

JJ: I think it's important to say it out loud. I really do.

JM: For sure. Yeah, I really do. But humor and sarcasm; those are my defense mechanisms. The world can have a happy ending. If it's presented in the right light. Maybe we're dead. We've been vaporized, but maybe the world is a bright and shiny place.

JJ: The cockroaches over in the corner having wine and playing cards.